

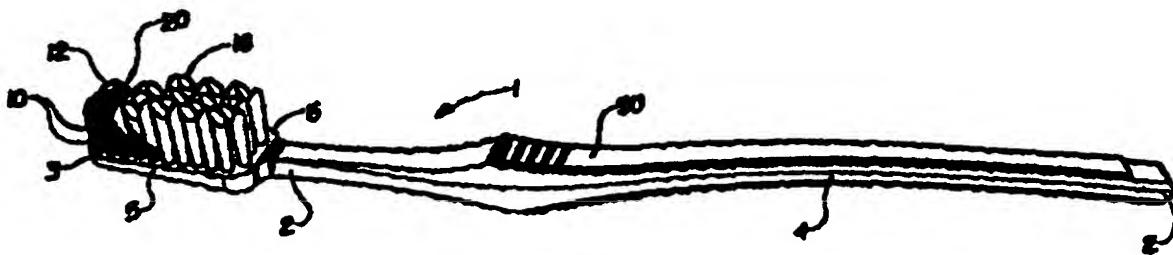
PCTWORLD INTELLECTUAL PROPERTY
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE

WO 9607343A1

(51) International Patent Classification ⁶ : A46B 9/04		A1	(11) International Publication Number: WO 96/07343 (43) International Publication Date: 14 March 1996 (14.03.96)
(21) International Application Number: PCT/US95/11310 (22) International Filing Date: 6 September 1995 (06.09.95) (30) Priority Data: 08/303,979 9 September 1994 (09.09.94) US 08/304,304 12 September 1994 (12.09.94) US (71) Applicant: THE PROCTER & GAMBLE COMPANY [US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US). (72) Inventor: VOLPENHEIN, Daniel, William; 3469 Wildwood Drive, Maineville, OH 45039 (US). (74) Agents: REED, T., David et al.; The Procter & Gamble Company, 5299 Spring Grove Avenue, Cincinnati, OH 45217 (US).			(81) Designated States: AU, CN, JP, KR, MX, NZ, SG. Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: TOOTHBRUSH EXHIBITING A GENERAL THREE-DIMENSIONAL BRISTLE PROFILE AND HAVING RAISED PROFILED OUTER TUFTS



(57) Abstract

The toothbrush has an elongate member (50) extending between two ends. The elongate member (50) has a head (5) at one of its ends. The head (5) has a plurality of tufts (10) comprising a multiplicity of bristles (20). The tufts (10) have proximal ends (11) attached to the head (5), distal ends (12) extending outwardly from the head (5) and sides extending between the distal and proximal ends (12). The distal ends (12) of the tufts (10) are angled downwardly from a peak so the adjacent tufts form a V-shaped profile when looking at the side of the tufts. The tufts (10) are arranged on the head (5) so as to define outer tufts (18), adjacent the outer perimeter of the head (5), and inner tufts (19). A predetermined number of the outer tufts (18) have their peaks extending further away from the head (5) than all of the peaks of the inner tufts (19) so as to provide improved inter proximal penetration.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

TOOTHBRUSH EXHIBITING A GENERAL THREE-DIMENSIONAL BRISTLE PROFILE AND HAVING RAISED PROFILED OUTER TUFTS

5

FIELD OF THE INVENTION

The present invention relates to toothbrushes, and more particularly, to toothbrushes which exhibit a three-dimensional bristle profile to provide improved cleaning in inter proximal areas without increasing gum irritation.

10

BACKGROUND OF THE INVENTION

The fundamental purpose of toothbrushes is to remove plaque and debris from tooth surfaces, both along their outer surfaces and in the inter proximal areas as well as provide gum and inter dental stimulation. While most commercially available toothbrushes clean the outer surfaces of teeth adequately toothbrushes having a three-dimensional or "V" shaped profile, when viewed in side profile, render the toothbrush particularly adept at cleansing and stimulation.

Recently, there has been a desire to provide a "V" shaped profile toothbrush which provides improved inter proximal penetration, especially at the gum line.

20

SUMMARY OF THE INVENTION

In accordance with the present invention there is provided a toothbrush which provides superior penetration/cleaning as well as gum and inter dental stimulation. The toothbrush has an elongate member extending between two ends. The elongate member has a head at one of its ends. The head has a plurality of tufts comprising a multiplicity of bristles. The tufts have proximal ends attached to the head, distal ends extending outwardly from the head and sides extending between the distal and proximal ends. The distal ends of the tufts are angled downwardly from a peak so that adjacent tufts form a V shaped profile when looking at the side of the tufts. The tufts are arranged on the head so as to define outer tufts, adjacent the outer perimeter of the head, and inner tufts. A predetermined number of the outer tufts have their peaks extending further away from the head than the peaks of all of the inner tufts so as to provide improved inter proximal penetration.

35

BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims which particularly point out and distinctly claim the invention, it is believed the present invention will be better understood from the following description of several particularly preferred

embodiments taken in conjunction with the accompanying drawings, in which like reference numerals identify similar elements and wherein;

Figure 1 is a perspective view of a preferred embodiment of the toothbrush in accordance with the present invention.

5 Figure 2 is a simplified side view of the head of the toothbrush shown in Figure 1.

Figure 3 is a front view of the head of the toothbrush shown in Figure 1.

DETAILED DESCRIPTION OF THE INVENTION

10 In a particularly preferred embodiment seen in Figure 1, the present invention comprises a toothbrush 1, for achieving improved inter proximal cleaning and gum and inter dental stimulation. Toothbrush 1 includes an elongate member 50 extending between two ends 2 and 3. End 2 comprises a handle portion 4 and end 3 comprises a head 5 having outer perimeter 6. Handle 4 preferably has a non-slip grip area 104
15 made from any suitable material known in the art including santoprene. For applications such as electric toothbrushes, the handle portion 4 may comprise suitable attachment means (not shown) for securing the brush to the driving means. Head 5 has a plurality of tufts 10 comprising a multiplicity of bristles 20. The tufts 10 are disposed on the head so as to define outer tufts 18, adjacent the outer perimeter 6 of
20 head 5, and inner tufts 19. As seen from Figure 2 tufts 10 have proximal ends 11 attached to said head, distal ends 12 extending outwardly from head 5, and sides 13 extending between proximal end 11 and distal end 12. As seen from the figure distal ends 12 of tufts 10 are angled downwardly from peaks 14 so that adjacent tufts form a "V" shaped profile when looking at the sides 13. A predetermined number of outer
25 tufts 18 have distal ends which extend outwardly from the head a greater distance than the distal ends of the inner tufts 19. This provides for improved inter proximal penetration, especially at the gum line. All of the bristles are preferably end rounded to protect gum tissue.

As seen from Figure 2 tufts 10 of toothbrush 1 form a straight-"V" shaped
30 side profile having five peaks 14. For an adult sized toothbrush, the total number of V's preferably ranges from about three to about seven. The distance from the top of one V to another preferably ranges from about 0.16 inches to about 0.30 inches, and even more preferably, from about 0.19 inches to about 0.25 inches. The distance from the bottom to the top of the "V" is preferably about 0.14 inches with a range of
35 from about 0.10 inches to about 0.17 inches. It is preferred that the tufts of each row are preferably aligned. The longitudinal row spacing, the longitudinal distance between adjacent tufts 18, as measured in a direction parallel to the length of elongate member 2 preferably ranges from about 0.02 inches to about 0.08 inches, and even

more preferably from about 0.04 inches to about 0.07 inches.

The bristles 20 in combination have a bristle stiffness which can be characterized numerically by the following equation:

5 Bristle
 Stiffness = $\frac{D^2 E}{X^2} * \frac{(\# \text{ Bristles})}{1 \times 10^6}$

where; D = bristle diameter, in inches

E = modulus of elasticity of the bristle material

10 when wet, e.g. for nylon this is a constant, 460,000 psi

X = average bristle length across the head 16 of the brush in inches

bristles = total number of bristles on head 5

The bristle stiffness preferably ranges from about 0.2 to about 0.8.

15 The diameter "D" bristles 20 preferably ranges from about 0.006 inches to about 0.009 inches. Average bristle length preferably ranges from about 0.30 inches to about 0.55 inches and even more preferably from about 0.34 inches to about 0.44 inches. The total number of bristles 20 in the head 5 preferably from about 1,200 to about 5,000, and even more preferably from about 1,600 to about 3,500.

20 Buttressing is the tendency of adjacent bristles to support or buttress each other. The Buttress Factor of the brush, is achieved by dividing the cross-sectional area taken up by the bristles 20 by the total cross sectional area of the tufts 10 at the base. Numerically, the preferred Buttress Factor for brushes of the present invention ranges from about 0.8 to about 0.96.

25 A preferred method of achieving end rounded bristles 20 in a "V" shaped format is to first square cut or shear a group of bristles perpendicular to the length of the bristles. The cut ends of the bristles are then ground while in a common plane to remove any sharp or protruding edges from each bristle. The bristles are then moved relative to each other to produce a desired three-dimensional shape at the exposed end of the tuft. The attachment end of the bristles are then preferably square cut or
30 sheared to the appropriate length. This method is further described in German Patent Application 3820372 which published on December 20, 1989, which is hereby incorporated herein by reference. The attachment end of the bristles is then preferably heated to form a molten mass and placed against the heated head. As the molten materials cool, the tufts are secured to the head. The latter method is further
35 described in United States Patent 4,637,660 which issued on January 20, 1987 to Weihrauch, which is also hereby incorporated herein by reference.

40 As mentioned above a predetermined number of outer tufts 19 on head 5 have distal ends which extend above all of the distal ends of the inner tufts. In a preferred embodiment the outer tufts which have their distal ends extending above all of the distal ends of the inner tufts are those most adjacent the elongate member 50. This

provides for greater independent bristle action at the gum line for improved inter proximal penetration and cleaning. The extended outer tufts can ride along the gum line and penetrate and clean with reduced interference from the inner tufts. For a full size head of an adult tooth brush there are preferably 24 outer tufts, 12 on each side, of which half (12) of the outer tufts are extended above the inner tufts. Preferably, the back 6 tufts on either side are the ones which are extended. For a compact head toothbrush, as shown in the figures, there are preferably 20 outer tufts, of which the back 6 on either side are extended. The extended outer tufts are preferably have from about 0.5mm to about 2mm higher peak than the peaks of the inner tufts and they are most preferably have about 1mm higher peak than the inner tufts. Preferably the inner tufts have a peak height of about 11.5mm. The ratio of the peak height of the inner tufts versus the peak height of the extended outer tufts ranges from about 0.85 to about 0.96.

Although particular embodiments of the present invention having been shown and described, modification may be made to the toothbrush without departing from the teachings of the present invention. Accordingly, the present invention comprises all embodiments within the scope of the appended claims.

What is claimed is:

What is Claimed is:

1. A toothbrush comprising having an elongate member extending between two ends, the elongate member has a head at one of the ends, the head has an outer perimeter and a plurality of tufts disposed thereon, the tufts comprising a multiplicity of bristles, the tufts having proximal ends attached to the head, distal ends extending outwardly from the head and sides extending between the distal and proximal ends, the distal ends of the tufts are angled downwardly from a peak so that adjacent tufts form a V shaped profile when looking at the side of the tufts, the toothbrush characterized by:

the tufts being arranged on the head so as to define outer tufts, adjacent the outer perimeter of the head, and inner tufts, wherein a predetermined number of the outer tufts have their peaks extending further away from the head than all of the peaks of the inner tufts.
2. The toothbrush according to Claim 1 wherein the predetermined number of outer tufts which have their peaks extending further away from the head than the peaks of the inner tufts are those most adjacent the elongate member.
3. The toothbrush according to Claim 1 wherein the head is oblong and defines a back, adjacent to the elongated member, a front and two sides.
4. The tooth brush according to Claim 3 wherein there are 22 outer tufts of which the 6 tufts on each side closest to the back of the head have their peaks extending further away from the head than the peaks of the inner tufts.
5. The toothbrush according to Claim 3 wherein there are 18 outer tufts of which the 6 tufts on each side closest to the back of the head have their peaks extending further away from the head than the peaks of the inner tufts.
6. The toothbrush according to any of the preceding Claims wherein the predetermined number of outer peaks which have their peaks extending further away from the head than the peaks of the inner tufts extend from about 0.5mm to about 2mm above the peaks of the inner tufts.

1/3

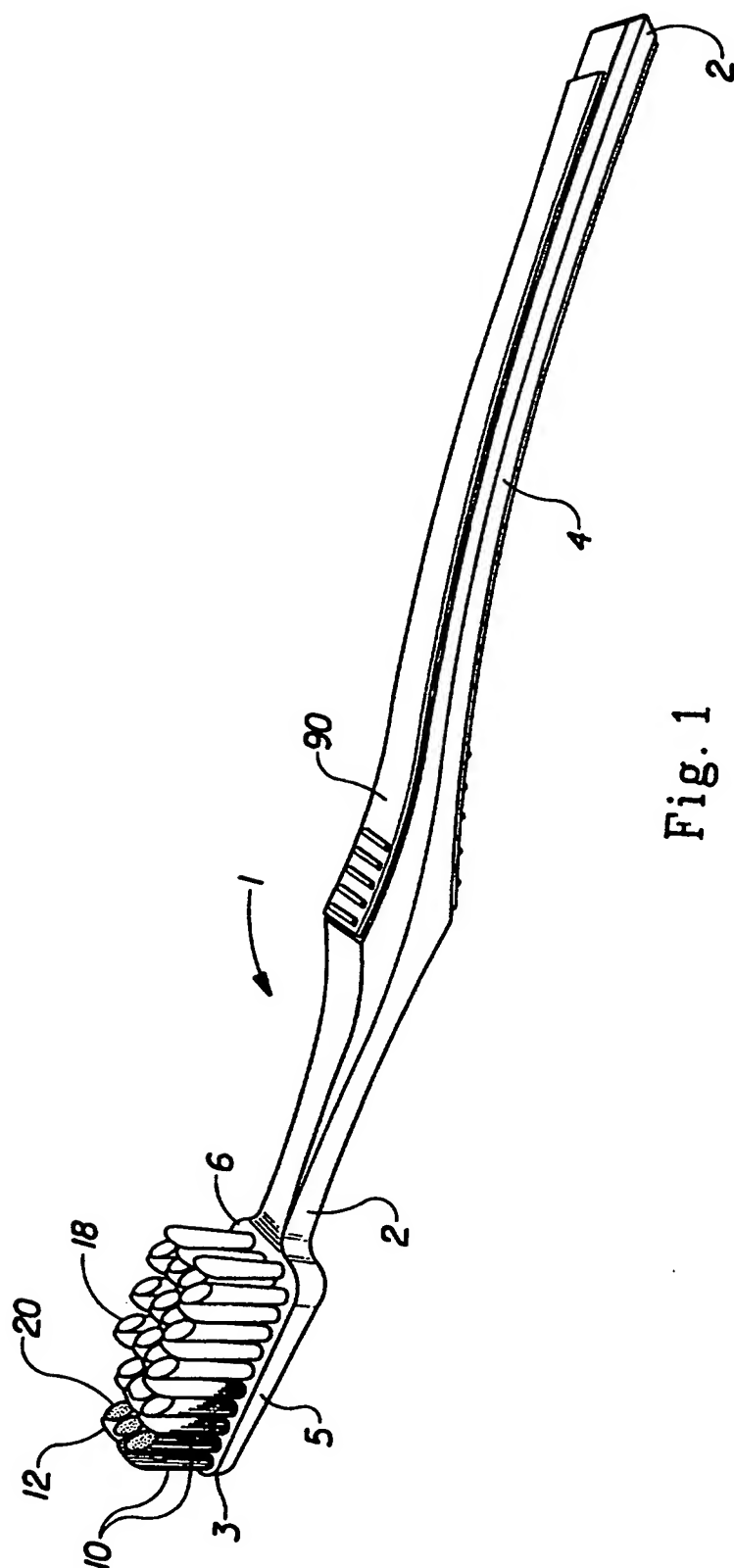


Fig. 1

2/3

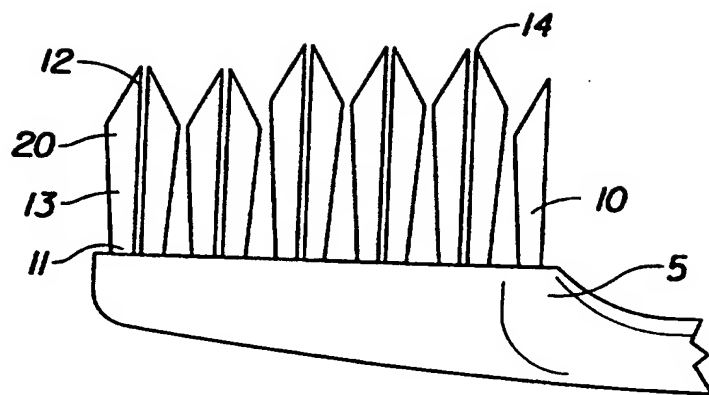


Fig. 2

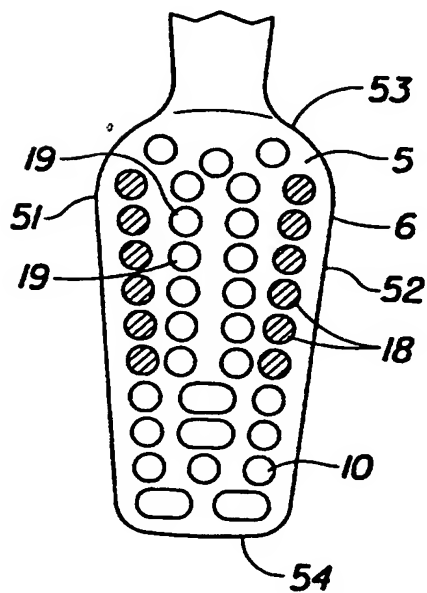


Fig. 3

3/3

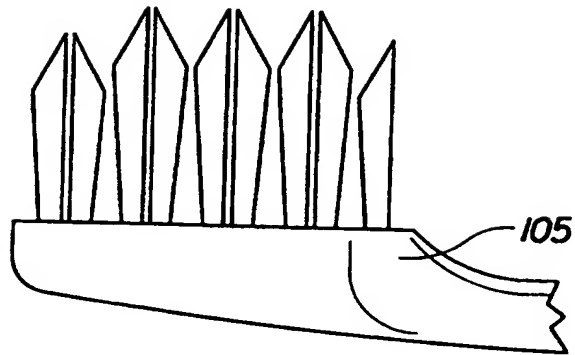


Fig. 4

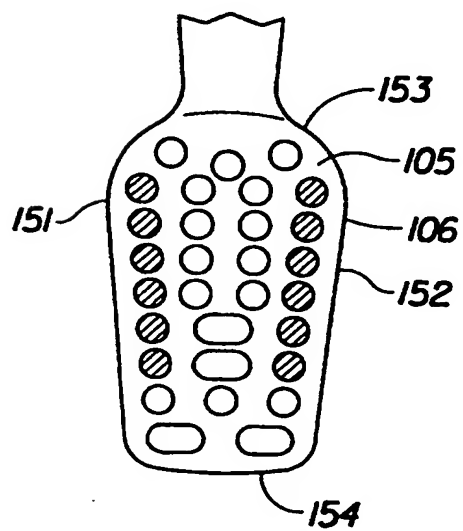


Fig. 5

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 95/11310

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A46B9/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A46B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE,U,93 03 673 (VEREINIGTE BÜRSTENFABRIKEN) 6 May 1993 see page 7, line 7 - page 11, line 5; figures ---	1
Y	US,A,4 894 880 (AZNAVOORIAN) 23 January 1990 see column 2, line 43 - column 3, line 40; figures ---	1
A	FR,A,2 548 528 (JOUVIN) 11 January 1985 see figures ---	1
A	US,A,3 934 298 (KIM) 27 January 1976 see column 6, line 16 - column 8, line 19; figures ---	1
-/--		

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

29 December 1995

Date of mailing of the international search report

12. 01. 96

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+ 31-70) 340-3016

Authorized officer

Ernst, R

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 95/11310

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-U-9303673	06-05-93	NONE	
US-A-4894880	23-01-90	NONE	
FR-A-2548528	11-01-85	NONE	
US-A-3934298	27-01-76	NONE	
US-A-5392483	28-02-95	NONE	